Nonlinear Sciences > Chaotic Dynamics

Periodic-orbit analysis and scaling laws of intermingled basins of attraction in an ecological dynamical system

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Chaotic dynamical systems with two or more attractors lying on invariant subspaces may, provided certain mathematical conditions are fulfilled, exhibit intermingled basins of attraction: Each basin is riddled with holes belonging to basins of the other attractors. In order to investigate the occurrence of such phenomenon in dynamical systems of ecological interest (two-species competition with extinction) we have characterized quantitatively the intermingled basins using periodic-orbit theory and scaling laws. The latter results agree with a theoretical prediction from a stochastic model, and also with an exact result for the scaling exponent we derived for the specific class of models investigated. We discuss the consequences of the scaling laws in terms of the predictability of a final state (extinction of either species) in an ecological experiment.

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